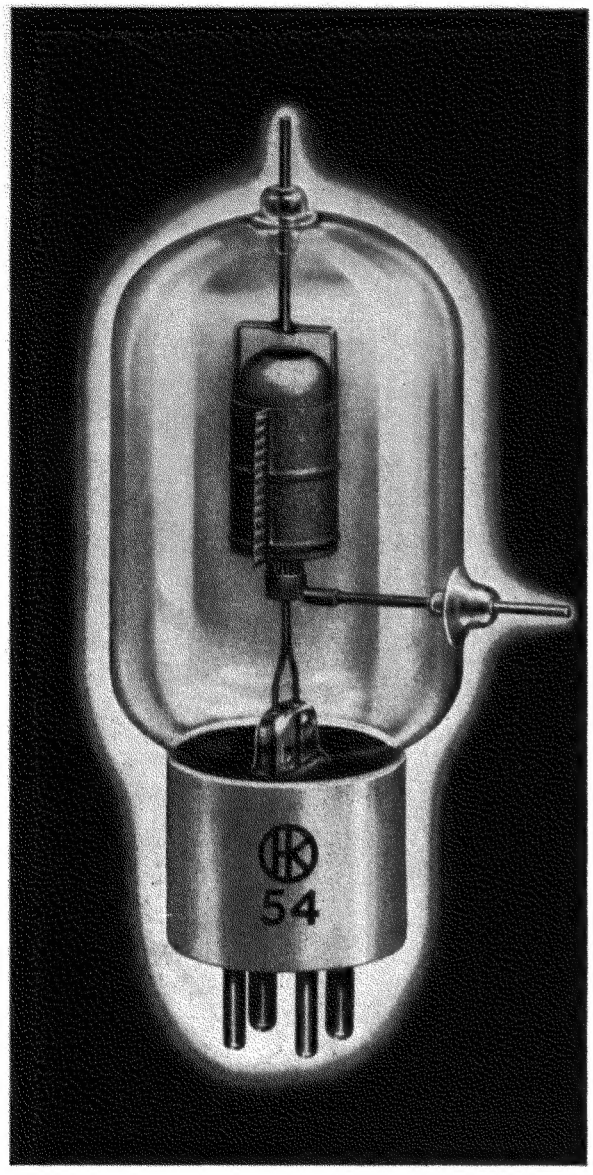
# GAMMATRON TYPE 54




## GENERAL PURPOSE TRIODE

**50 watt radiation cooled universal triode, medium mu. Special design permits high voltage operation and unusual UHF efficiency.**

### PHYSICAL DATA

| | |
|---|---|
| Plate | Cylindrical Tantalum |
| Grid | Braced Vertical Bar Tantalum |
| Filament | Thoriated Tungsten |
| Base | Medium 4 Pin Ceramic Base |
| Net Weight | 2½ Ounces |
| Shipping Weight | 8 Ounces |
| Maximum Height | 5-7/16 Inches |
| Maximum Diameter | 2-1/16 Inches |

### ELECTRICAL DATA

| | |
|---|---|
| Filament Voltage | 5.0 Volts |
| Filament Current | 5.0 Amps. |
| Normal Plate Dissipation | 50 Watts |
| Maximum Average Plate Current | 150 MA. |
| Maximum Average Grid Current | 30 MA. |
| Maximum Plate Voltage | 3000 Volts |
| Average Amplification Constant | 27 |

### INTERELECTRODE CAPACITANCES

| | |
|---|---|
| Grid-Plate | 1.8 Mmfd. |
| Grid-Filament | 2.0 Mmfd. |
| Plate-Filament | 0.2 Mmfd. |

The Type 54 GAMMATRON has amazing power capabilities even though it is small in size. It has very low interelectrode capacities, and it employs a domed plate construction confining the entire electron stream at very high frequencies. Thus, no power is wasted, and the UHF efficiency is unequaled by ordinary tubes. Tantalum elements are cleaned and degassed by Heintz and Kaufman's new and improved pumping process. The "getter" is eliminated, internal insulators are not used, and thus GAMMATRON tubes do not become gassy because every source of gas has been removed.

The 54 GAMMATRON has unusual stamina and is very versatile. Its excellent characteristics suit it as a Class C amplifier for low or ultra high frequencies, Class B audio amplifier, frequency multiplier and crystal oscillator.

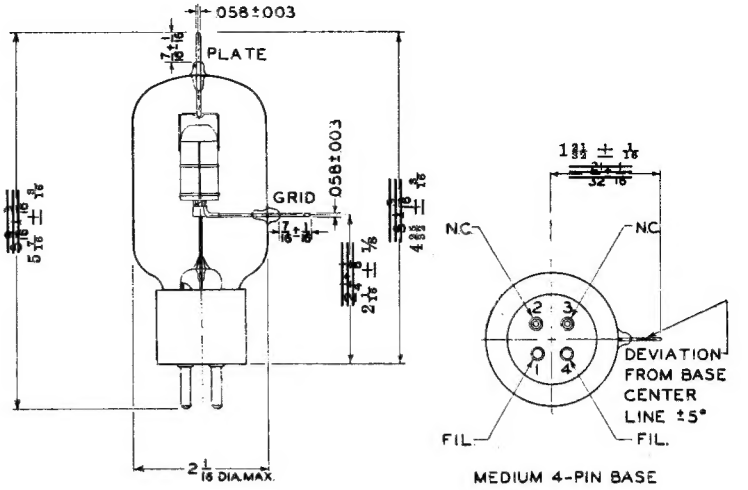
The tantalum plate is designed to run hot. Only a perceptible glow can be seen at 25 watts dissipation, and a dull cherry red color at 50 watts dissipation. This is normal, and no damage will result at this temperature. The convenience of the use of the plate color as an indication of proper circuit efficiency and tuning will be appreciated immediately after trying the 54 GAMMATRON.

5M 6-44

**HEINTZ AND KAUFMAN LTD.**
SOUTH SAN FRANCISCO, CALIFORNIA, U·S·A

## TYPE HK 54

The information on this and the following page does not represent exact conditions of operation to be imposed for any particular situation. Because tubes are used under many widely different conditions Heintz and Kaufman will gladly furnish information for applications which differ appreciably from the illustrative examples given.




### RADIO FREQUENCY POWER AMPLIFIER
### Class C UNMODULATED*

| | Maximum Rating Per Tube | Typical Operation, 1 Tube | | |
|---|---|---|---|---|
| Power Output | | 250 | 210 | 100 Watts |
| Driving Power | | 10 | 9 | 6 Watts |
| DC Plate Voltage | 3000 | 3000 | 2000 | 1000 Volts |
| DC Plate Current | 150 | 100 | 130 | 135 ma |
| DC Grid Current | 30 | 25 | 20 | 20 ma |
| DC Grid Voltage | −750 | −290 | −269 | −130 Volts |
| Peak RF Grid Voltage | | 465 | 465 | 304 Volts |
| Plate Dissipation | 50 | 50 | 50 | 35 Watts |
| Plate Input | 300 | 300 | 260 | 135 Watts |

*Carrier conditions for telegraphy.

### RADIO FREQUENCY POWER AMPLIFIER
### CLASS C PLATE MODULATED*

| | Maximum Rating Per Tube | Typical Operation, 1 Tube | | |
|---|---|---|---|---|
| Power Output | | 180 | 147 | 92 Watts |
| Driving Power | | 9 | 9 | 9 Watts |
| DC Plate Voltage | 2500 | 2000 | 1500 | 1000 Volts |
| DC Plate Current | 125 | 110 | 125 | 125 ma |
| DC Grid Current | 30 | 25 | 30 | 30 ma |
| DC Grid Voltage | −750 | −250 | −140 | −130 Volts |
| Peak RF Grid Voltage | | 422 | 310 | 295 Volts |
| Plate Dissipation | 40 | 40 | 40 | 35 Watts |
| Plate Input | 225 | 220 | 188 | 125 Watts |

*Carrier conditions for 100% modulation and 60% average value.

### AUDIO FREQUENCY POWER AMPLIFIER
### CLASS B*

| | Maximum Ratings Two Tubes | Typical Operation, 2 Tubes | | |
|---|---|---|---|---|
| Power Output | | 260 | 200 | 140 Watts |
| Driving Power** | | 12 | 10 | 10 Watts |
| DC Plate Voltage | 2500 | 2000 | 1500 | 1000 Volts |
| DC Plate Current, Zero Signal | | 24 | 40 | 40 ma |
| DC Plate Current, Maximum Signal | 300 | 180 | 198 | 233 ma |
| DC Grid Voltage | | −70 | −45 | −25 Volts |
| Peak AF Grid to Grid Voltage | | 360 | 300 | 295 Volts |
| Plate Dissipation | 100 | 100 | 96 | 91 Watts |
| Plate Input, Maximum Signal | 375 | 360 | 296 | 233 Watts |
| Load Resistance, Plate to Plate | | 36000 | 16800 | 8500 Ohms |
| Driver Transformer Ratio*** (Full secondary to full primary) | | 0.75 | 0.6 | 0.6 |

*All data for two tubes.

**Instantaneous power at crest of cycle; effective power is ½ of this value.

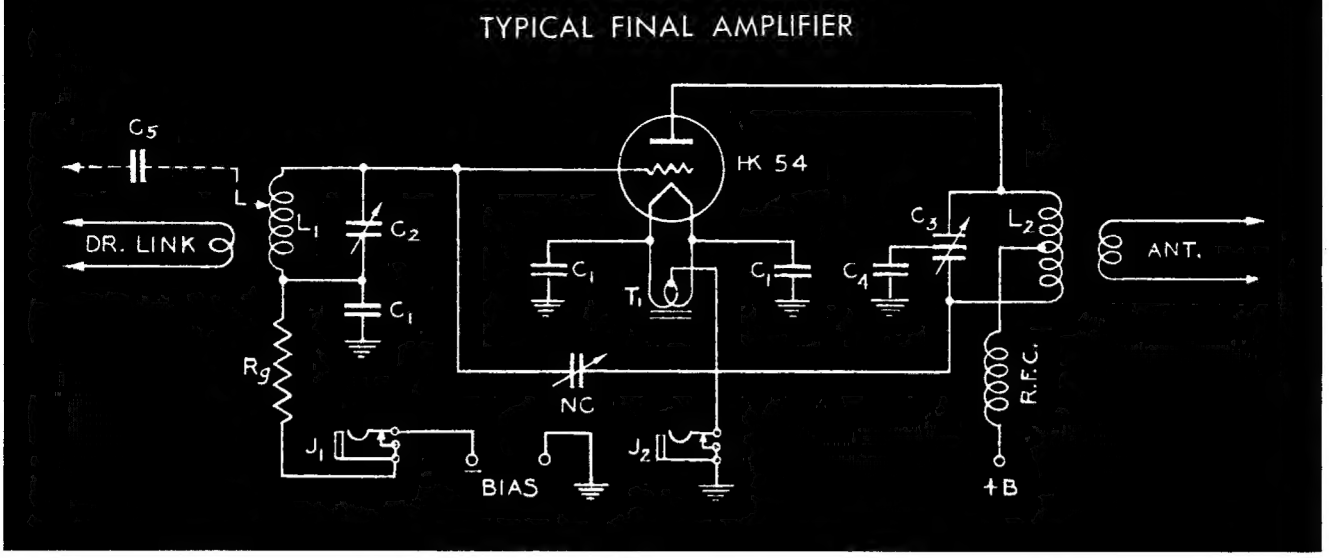
***Driver tubes 2 - 6V6 Class $A_1$. Plate volts 315. The use of inverse feed back is recommended to reduce distortion.

### RADIO FREQUENCY DOUBLER AMPLIFIER
### (Feedback neutralized by conventional methods)

| | Maximum Rating Per Tube | Typical Operation, 1 Tube | | | |
|---|---|---|---|---|---|
| Power Output | | 115 | 105 | 80 | 57 Watts |
| Driving Power | | 12 | 12 | 12 | 10 Watts |
| DC Plate Voltage | 3000 | 3000 | 2000 | 1500 | 1000 Volts |
| DC Plate Current | 150 | 55 | 77 | 85 | 100 ma |
| DC Grid Current | 30 | 14 | 15 | 20 | 20 ma |
| DC Grid Voltage | −750 | −700 | −500 | −420 | −339 Volts |
| Peak RF Grid Voltage | | 835 | 670 | 580 | 510 Volts |
| Plate Dissipation | 50 | 48 | 48 | 48 | 43 Watts |
| Plate Input | 165 | 165 | 155 | 127 | 100 Watts |

Gammatron Tubes

## TYPICAL FINAL AMPLIFIER




This typical final amplifier is capable of a maximum output of 250 watts and requires a driving power of only 10 watts. A small receiving tube such as a 6V6-G is sufficient. It may be link-coupled to the grid circuit or directly coupled with $C_5$ to the point on $L_1$ which provides sufficient excitation. It is advisable to supply enough fixed bias to prevent plate current flow under static conditions (see plate curve), and the remaining bias is then developed by the grid current flow through $R_g$. Thus: DC grid voltage = Fixed Bias + ($R_g \times$ DC grid current).

### COMPONENTS

$C_1$ — .01 mfd mica, 1000 volt working.
$C_2$ — 260 mmfd variable condenser, 1500 volt rating.
$C_3$ — 200 mmfd per section, 4500 volt rating variable condenser.
$C_4$ — .005 mfd mica, 5000 volt working.
$C_5$ — .001 mfd mica, 2500 volt working.
N.C. — Neutralizing condenser .7 to 4 mmfd.
$J_1$ and $J_2$ — Jacks to measure grid and cathode current.
$R_g$ — As required.
$T_1$ — 5.0 volt, 5 ampere filament transformer.

### COIL DATA

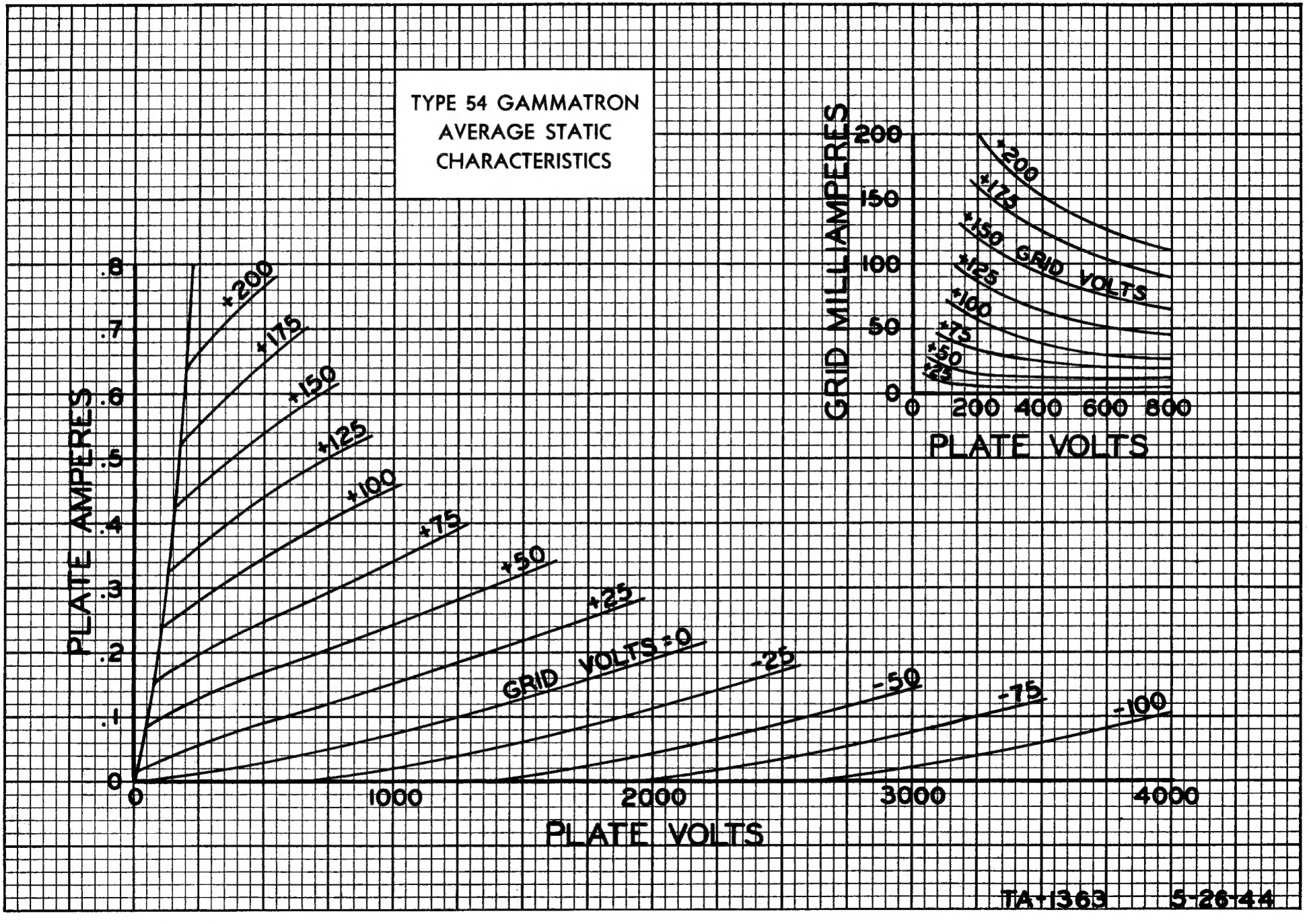
| Band | $L_1$ | $L_2$* |
|---|---|---|
| 160 Meters | 34 Turns #22 Enamel Close Wound Diameter 1½ Inches Length 1 Inch | 54 Turns #18 DCC Diameter 2½ Inches Length 4 Inches |
| 80 Meters | 20 Turns #22 Enamel Diameter 1½ Inches Length 1 Inch | 34 Turns # 16 Diameter 2½ Inches Length 4 Inches |
| 40 Meters | 13 Turns #22 Enamel Diameter 1½ Inches Length 1 Inch | 20 Turns #12 Diameter 2½ Inches Length 4 Inches |
| 20 Meters | 8 Turns #22 Enamel Diameter 1½ Inches Length 1 Inch | 10 Turns #12 Diameter 2½ Inches Length 3 Inches |
| 10 Meters | 5 Turns #16 Enamel Diameter 1½ Inches Length 1 Inch | 6 Turns #12 Diameter 2½ Inches Length 3½ Inches |

*Length includes ½ inch space at center for antenna or transmission line link windings.

### ULTRA HIGH FREQUENCY PERFORMANCE

| FREQUENCY | 30 | 60 | 120 | 200 mc |
|---|---|---|---|---|
| **Class C Unmodulated** | | | | |
| Max. Input | 250 | 215 | 180 | 140 Watts |
| Max. Plate Volts | 3000 | 2700 | 2500 | 2000 Volts |
| Typical Plate Efficiency | 80 | 77 | 72 | 64 Percent |
| **Class C Plate Modulated** | | | | |
| Max. Input | 210 | 180 | 150 | 115 Watts |
| Max. Plate Volts | 2500 | 2200 | 2000 | 1700 Volts |

Gammatron Tubes


TYPE 54 GAMMATRON
AVERAGE STATIC
CHARACTERISTICS
PLATE AMPERES
.8
.7
.6
.5
.4
.3
.2
.1
0
+200
+175
+150
+125
+100
+75
+50
+25
GRID VOLTS = 0
-25
-50
-75
-100
0
1000
2000
3000
4000
PLATE VOLTS
GRID MILLIAMPERES
200
150
100
50
0
+200
+175
+150
+125
+100
+75
+50
+25
GRID VOLTS
0
200
400
600
800
PLATE VOLTS
TA-1363
5-26-44